behaviour depends on inborn, ready-made capacity; it is not reflective. But why did Fabre think that "transformism" was compelled to rank instinct in a line with reason?

Fabre was a very great naturalist, but not, of course, invariably wise. Thus, once in a way it may have been useful to deplore the fact, or supposed fact, that "natural history, youth's glorious study, has, by dint of cellular improvements [*sic*], become a hateful and repulsive thing," but it was unwise to reiterate contempt for the labours of the analytic zoologist who follows the nerve-fibres of a Cirripede, or counts the joints of a Crustacean's antenna, or puzzles over the architecture of an Annelid's egg. Fabre had no sympathy with this sort of study, and he did not understand it. The same must be said in regard to the great naturalist's attitude to "transformism" or evolution-theory.

The translation continues to be clear and spirited, but the right word has not always been found. More care should have been taken with the little notes; thus the word "species" is misused with tiresome reiteration; not every Annelid is a red-blooded worm; it is unhappy to say that "zoophytes are plant-like sea-animals, including star-fishes, jelly-fishes, sea-anemones, and sponges"; and surely the cicada is not "akin to the grasshopper." But these and their like do not affect the general success of the translators' work. We do not think that the British public could find reading much more wholesome than these essays by one of the greatest of observers, but we are in its name obliged to express to the publishers our surprise that this fascinating volume should contain several essays which we have read in book form before. We read "The Harmas" and "The Bluebottle" in "The Life of the Fly"; we read "The Processionary Caterpillar" and "The Cabbage Caterpillar" in "The Life of the Caterpillar." But can we have too much of a good thing?

PROF. P. BLASERNA.

OF the life and work of Prof. Pietro Blaserna, who died at Rome on February 26, an interesting account is now contributed by Prof. Cantone to the *Atti dei Lincei*, xxvii., (1) 7. Prof. Blaserna was born on February 29, 1836, at Aquileja, near Gorizia, and attended school at the latter place, afterwards proceeding to Vienna, where, after he had completed his degree course, he assisted in the physical department. Being thus a native of the scene of recent conflicts between Italy and Austria, he was entirely Italian in his sympathies, and, after studying in Paris under Regnault, he obtained a chair of physics, first at Palermo, and then at Rome. Here he devoted his main efforts to teaching and organisation, and succeeded in building up a school of physicists of which Italy has every reason to be proud. Instead of giving most of his time to researches, which might have necessitated his maintaining an attitude of exclusiveness towards elementary students, Prof. Blaserna endeavoured to make his classes popular, and thus to disseminate a scientific spirit in Italy. At Rome the laboratory of practical physics was originally in a church building, but was removed in 1881 to the Istituto di Panisperma. A weekly colloquium was instituted at an early stage, and the names of Alfonso Sella, Eugenio Beltrami, and Vito Volterra are among those who derived inspiration from him.

To physicists outside Italy Prof. Blaserna's name will be familiar in connection with the Accademia dei Lincei, of which he was president for twelve years, up to December, 1916. Although his duties left scanty time for research, Prof. Blaserna made important contributions to science connected with electromagnetic induction, determination of refractive indices, tangent galvanometers, and the polarisation of the light of the corona in the eclipse of 1870. Of practical problems, that of the design of the best form of amphitheatre was solved by him and applied to the construction of his classroom; this problem also led to a study of certain properties of Z and Gamma functions. Much work of national importance was also entrusted to Prof. Blaserna, who figured prominently in many proceedings of the Second Chamber. He was keenly interested in music, which he studied from the acoustical point of view, and he was instrumental in standardising the concert pitch for Italy, besides writing a popular treatise on sound and music.

G. H. B.

NOTES.

IN a long list of promotions in, and appointments to, the Order of the British Empire, made on the occasion of the King's birthday, we notice the following names of men who have been honoured for scientific services in connection with the war:—*Knights Commanders (K.B.E.)*: Col. H. E. F Goold-Adams, late Controller, Munitions Inventions Department; Mr. Horace Darwin, F.R.S., chairman, Cambridge Scientific Instrument Co., Ltd., member of Munitions Inventions Department Panel; Lt.-Col. A. G. Hadcock, F.R.S., managing director, Sir W. G. Armstrong, Whitworth and Co., Ltd.; Dr. A. C. Houston, director of Water Examinations, Metropolitan Water Board; Mr. H. D. McGowan, managing director of Nobel's Explosive Co., Ltd.; Prof. T. H. Middleton, Deputy Director-General, Food Production Department, Board of Agriculture; Col. Sir Frederic L. Nathan, chairman, Standing Committee on the Causes of Explosions at Government and Controlled Factories, Ministry of Munitions, chairman Advisory Committee on Alcohol Supplies for War Purposes; Mr. A. Nimmo, president, Mining Association of Great Britain, chairman Board of Trade Committee on the Coal Trade after the War, member Central Coal and Coke Supplies Committee; Admiral Sir Richard H. Peirse, Naval Member of the Central Committee of the Board of Invention and Research, Mr. P. L. D. Perry, Director of Mechanical Warfare, Ministry of Munitions; Mr. J. W. Restler, chairman, Metropolitan Munitions Committee, chief engineer Metropolitan Water Board. *Commanders (C.B.E.)*. Prof. E. C. C. Baly, F.R.S., professor of chemistry, Liverpool University, Deputy Inspector of High Explosives, Liverpool Area; Dr. J. Barcroft, F.R.S., Superintendent of Physiological Investigations, Chemical Warfare Department, Ministry of Munitions; Mr. Conrad Beck, president, British Optical

Instrument Manufacturers' Association; Dr. H. N. Dickson, professor of geography, University College, Reading, Head of Geographical Section, Naval Intelligence Division, Admiralty; Prof. H. B. Dixon, F.R.S., professor of chemistry, Manchester University; Prof. A. S. Eve, F.R.S., Resident Director of Research, Admiralty Experimental Station, Parkeston; Prof. E. C. K. Gonner, professor of economic science, Liverpool University, Director of Statistics, Ministry of Food; Mr. C. H. Wordingham, president, Institution of Electrical Engineers, Director of Electrical Engineering, Admiralty. The list of several hundreds of Officers of the Order (O.B.E.), published on June 7, includes the names of a number of men of science.

The creation of extensive hay dumps for Army requirements tends to bring into prominence the question, which is ever-recurrent in agricultural practice, as to the extent to which spontaneous ignition may take place and the conditions that are favourable to it. The commonest cases of spontaneous heat production are, of course, those in which living material, seeds, leaves, etc., undergo a "sweating" process when placed in heaps, and this change, which is associated with respiratory and enzymic changes, also proceeds to a certain extent in stacks of green or fresh hay. A much more potent effect is, however, exerted by the growth of micro-organisms, bacteria, and moulds, some of which have been shown to be capable of raising the temperature to upwards of 70° C. Beyond this temperature it is doubtful whether even these organisms can continue growth, and this view is supported by the fact that only carbon dioxide, and not inflammable gas, is produced, but the high temperature already attained, and possibly the products of microbial action, serve to initiate purely chemical oxidation changes, which eventually raise the temperature to the region of 90°–95°. During this phase the hay assumes a dark brown or black colour, small quantities of formic acid are produced, and there is a loss of pentosans and other nitrogen-free constituents. The latter temperature is, of course, unable to give rise to firing, but in view of the fact that substances such as bran become pyrophorus on exposure to temperatures of 145°–175°, and that energetic changes take place as low as 130°, it has been assumed that a prolonged action at the temperature occurring in the haystack may also result in the formation of similar pyrophorus substances. The presence of moisture and of easily decomposable compounds and a free air supply are predisposing conditions to excessive heating.

Some interesting notes, which someone should collect, have been made from time to time by competent observers in regard to the behaviour of various animals under the terrific conditions of noise, vibration, explosion, and other disturbances at the front. Thus it seems clear that some kinds of birds, under the dominance of instincts of feeding, nesting, or brooding, behave as if they were indifferent to the most conspicuous anomalies of their environment. Living creatures of many kinds are not in the least impressed by sounds which have no interest for them. Just as human perceptions are affected by pre-established concepts, so the intensity of animal sensations is affected by previously established associations. To terrific disturbances, which have neither inherited nor acquired "meaning," an acutely sensitive organism may remain quite indifferent. The cuckoo's calls are not interrupted by the thunderstorm. But another point is raised by some observations which Capt. W. Neilson Jones has just sent us. These refer to the diverse ways in which sheep and cows react to dummy bombs released from an aeroplane. The cows seem entirely indifferent to the "swish" of the falling bomb, but the sheep "invariably scatter in panic." The first question is whether this can be taken as a well-established fact, and the answer must take the form of a considerable number of precisely and impartially observed cases. Supposing it to be a fact, we face the second question of interpretation. Have the cows a different—more placid—temperament? But how excited they get at times by the buzzing of flies that cannot hurt them. The excitement is probably due to fallacious association with the buzzing of blood-sucking flies which can hurt them; and Capt. Jones's suggestion is that sheep are panic-struck because the swish of a falling bomb is probably not unlike the sound of a bird of prey, say a golden eagle, swooping upon the lambs. Susceptibilities of ancient origin may prove very persistent, as Mr. Robinson has so well shown in his suggestive book "Wild Traits in Tame Animals."

Count A. de la Baume Pluvinal, Sir Frank Dyson, and Prof. F. Schlesinger have been elected foreign members of the Society of Italian Spectroscopists.

On the recommendation of the council of the Royal Society of Arts, the Albert medal for 1918 has been awarded to Sir R. T. Glazebrook "for his services in the application of science to the industries of peace and war, by his work as director of the National Physical Laboratory since 1899, and as chairman of the Advisory Committee for Aeronautics."

According to a correspondent of the *Times* (June 8), a severe earthquake was recorded at the Sydney Observatory on the preceding day. The epicentre is placed, probably on the evidence of the seismogram, in Keppel Bay, on the east coast of Australia, about 650 miles north of Sydney. The strength of the earthquake is evident from the fact that the north-eastern towns of New South Wales, not less than two hundred miles south of Keppel Bay, were severely shaken. The chief interest of this shock lies in its occurrence in a district which is rarely visited by earthquakes.

In view of the public interest which is being taken at present in the Madsen machine-gun, we note that the *Engineer* has reprinted in its issue for June 7 a description of this gun, which first appeared in our contemporary on March 10, 1916. The article includes photographs of the weapon, and also a set of drawings showing the arrangement of the breech mechanism. It is impossible to attempt any description of this mechanism here on account of its complicated nature, and readers interested should refer to the original article.

We regret to note that the *Engineer* for June 7 announces the death of Mr. Thomas Aitken on May 27. Mr. Aitken was road surveyor for the Cupar district of the County of Fife during the last thirty-six years. His invention of a road-tarring machine brought him into prominence during the introduction of the motor-car, and his machine gained the gold medal and the prize of one hundred guineas at the Road Surveyors' International Competition at Staines in 1907. His book, "Road-making and Maintenance," has now become a standard work. He was a member of the Institution of Civil Engineers.

We learn from *Science* that Mr. W. Hague Harrington, one of the best known of the older Canadian entomologists, died on March 13 at Ottawa, Canada, at the age of sixty-six years. Mr. Harrington was one of the founders of the Ottawa Field Naturalists' Club, and at one time was president of the Entomological Society of Ontario. In 1894 he was elected a fellow of the Royal Society of Canada. For many years his main interest in life was entomology, and he brought together a large collection of Canadian Coleoptera and Hymenoptera. He was a systematist of recognised standing, and probably the highest authority on Hymenoptera in the Dominion of Canada.

PROF. P. GIACOSA gives elsewhere in this issue his impressions of the recent visit of university representatives from Italy to some of our educational institutions. The Italian delegation, which was invited by the British Government to visit the universities of the United Kingdom, consisted of Profs. Arcangeli, Bianchi, Borgese, Columba, Credaro, De Viti de Marco, Giacosa, Lori, Nasini, Romagnoli, Ruffini, and Volterra. For various reasons Profs. Borgese, De Viti de Marco, and Romagnoli were unable to accept the invitation. Prof. Ruffini, who was detained in Rome on political business, delegated Prof. Galante to represent him. The delegates visited Winchester, Portsmouth, London, Oxford, Cambridge, Leeds, Manchester, Sheffield, Edinburgh, and Glasgow.

THERE have been several rumours during the last few months to the effect that the Germans were building even larger raiding aeroplanes than the Gothas with which we are already acquainted, and it now appears that these rumours were well founded. A giant machine has been recently brought down in France, of which some particulars appeared in the *Times* for June 8. The information given shows that the machine had a span of about 140 ft. and a length of about 70 ft. The weight, fully loaded, was about 14½ tons, of which two tons consisted of bombs. The machine carries four engines of 300 h.p. each, and the speed is stated to be seventy-five to eighty miles per hour. If these figures are correct, the aeroplane in question appears to be the largest machine which has yet been flown. It is not by any means definitely established that the largest possible bombing machines will be the most effective; indeed, it is reasonable to suppose that a larger number of smaller machines with a higher speed would be the more effective and less easy to attack. The larger a machine becomes, the more difficult it is to land in the dark, and the more vulnerable it will be when there is a chance of definite aim from the ground or of attack by fighting machines. While this new development is highly interesting from the point of view of the possible development in the size of machines, it does not seem likely that these giant aeroplanes will appreciably increase the effectiveness of the enemy's night raids.

MR. FRANK HARWOOD LESCHER, who died on May 12, aged seventy-five, was for many years one of the best-known men in the wholesale drug trade, into which he made his entry more than sixty years ago. As a student he distinguished himself by carrying off the medal for botany and materia medica, a success which was soon followed by the Pereira medal, the blue ribbon of the Pharmaceutical Society. In after-life materia medica remained his favourite study, the results of which were, to a considerable extent, embodied in his "Recent Materia Medica," in which all the newer remedies were ably discussed. Averse to publicity, his contributions to the current journals were not numerous, but his work was, nevertheless, continuous and his store of knowledge profound. Those who were fortunate to hear it will not readily forget the fascinating and scholarly address delivered a short time ago to the students of the Pharmaceutical Society, in which he summed up the results of his researches on the drug-routes of the world. By his death a genial, active, and intellectual worker has been lost.

THE interim report of the Gas Traction Committee, noticed in NATURE of May 9, p. 188, referred to the need for experiments and tests in connection with the determination of factors affecting portable gas-generating plants, and the commercial use of gas for traction purposes in containers at high pressures, together with questions relative to liquefaction, absorption, and enrichment, as well as in regard to improvements in the existing arrangements for effecting the admixture of gas and air in the requisite proportions under varying conditions. A sub-committee of the Gas Traction Committee has now been appointed for the purpose of giving effect to this recommendation and of furnishing periodical statements on it. The sub-committee consists of Sir Boverton Redwood (chairman); Lieut.-Col. R. K. Bagnall-Wild, Mr. W. Worby Beaumont, Major A. McN. Cooper-Key, Prof. C. Vernon Boys, Major B. Hopkinson, Mr. E. S. Shrapnell-Smith, and Mr. S. Straker, with Mr. Cecil H. Lamb, of H.M. Petroleum Executive, as secretary.

THE death of M. Jules Lachelier, at the age of eighty-six, which occurred recently, deprives us of an eminent French philosopher who marked a distinct stage in the development of the philosophical movement of his country. He linked Poincaré and Boutroux and Bergson with Ravaisson and Maine de Biran. Lachelier was not widely known, and he contributed very little to philosophical literature—two volumes on "Le Fondement de l'Induction" and an edition of Leibniz—but his influence as a teacher was immense. His own philosophical theory was a refined form of idealism which goes for its origin direct to Leibniz. A science of Nature, he held, would be an impossibility if the laws of thought were not at the same time, as Kant maintained, the constitutive laws of Nature; but he went further than Kant, believing that there is a method, which he named reflection, by which thought possesses itself in its very essence, and has nothing to seek beyond. Sensible knowledge he conceived, in the manner of Leibniz, as an obscure form of intellection. His chief work and his influence dates back to the years 1864 and 1877, during which period he lectured regularly on philosophy as Maître de Conférences in the Ecole Normale Supérieure. In the latter year he was appointed Inspecteur Général de l'Instruction publique. Since 1901 he lived in practical retirement, but continued to take a keen interest in philosophy, especially as a member of the Societé Française de Philosophie, assisting in discussions and in the work of producing the "Vocabulaire philosophique." He died on January 18 last at Fontainebleau.

IN 1896 Dr. Guiliano Vanghetti, an Italian physician, when seeking to ameliorate the condition of the hapless soldiers who had been mutilated by the Abyssinians after falling into their hands as prisoners of war, conceived the idea of utilising the muscles in the stumps of amputated limbs as the "driving-power" for artificial limbs. The technical difficulty of yoking such muscles to the levers of artificial limbs proved to be very great, and up to 1914 only twenty patients had been operated on. With the outbreak of the present war this new departure of surgery—the "kinematisation of stumps"— was taken up by a young Italian surgeon, Prof. V. Putti, professor of orthopædic surgery in the University of Bologna and director of the Rizzoli Institute. Prof. Putti has improved the technique needed to make such operations a success, and has now operated on fifty cases. His patients, by means of muscles retained in the stumps of their limbs, are able to execute movements in artificial hands, knees, and feet. During a recent visit to England Prof. Putti demonstrated his methods and results to British surgeons, and convinced them that this new departure in surgery deserves their most favourable consideration. The muscles of the stumps are yoked to artificial levers by various devices, and it is surprising how the parts become tolerant of the abnormal burdens placed on them by the surgeon. The patient is even able to estimate the weight of the load which he attempts to lift. For success the surgeon depends on the intelligence and perseverance of his patients as much as on his own technical skill. It would be wrong to give rise to the hope that "kineplastic" surgery can ever give a limbless man conditions of movement comparable to those he has lost, but this new departure in surgery does promise an amelioration of our former helpless outlook. Prof. Putti has presented models and casts of "kinematised stumps" to the museum of the Royal College of Surgeons of England.

APPRECIATIVE notices of the work of Mr. C. D. Ahrens, who died on March 14, at eighty-one years of age, are contributed to the Journal of the Quekett Microscopical Club by Mr. E. M. Nelson and Prof. F. J. Cheshire. We extract the following particulars from Mr. Nelson's notice:—Mr. Ahrens was a prism and spar slitter. He made Nicol prisms and analysers, quartz and calcite prisms of all kinds, as well as the glass prisms for Wenham binoculars. In 1867 he designed a binocular upon quite a novel plan. The rays issuing from the back of the objective were separated to an angle of 15° by a double-image calcite prism; these rays were then crossed over by two flint prisms, to correct the chromatic dispersion. The rays used were the extraordinary, the ordinary being diverted out of the path. The tubes were equally inclined to each other. In 1881 he introduced another new binocular, in form like Stephenson's. It had parallel tubes, but they were bent as in the Stephenson. The ingenious part of the arrangement was that the beam from the back of the objective was divided by two Wollaston camera-lucida prisms placed back to back; these deflected the rays right and left, then another prism with two reflections bent them up the tubes. Probably a carefully made binocular on this plan would be a very successful instrument. In 1884 he designed a bent-tube erecting monocular microscope; obviously a most useful instrument, it is surprising that some energetic manufacturer has not taken up this idea. In the same year Mr. Ahrens designed a new polarising prism, which was further improved by Mr. H. G. Madan in 1885. In 1886 he brought out yet another improved form of polarising prism, the object of which was to lessen the ratio of its length to its breadth. That of the Nicol is about 3 : 1, while the Ahrens was $1\frac{1}{2}:1$. In 1887 he made an erecting microscope the design of which has had far-reaching consequences. The erection was obtained by Porro prisms. It was Ahrens who first brought the long-forgotten Porroprism to remembrance.

WE have received the Report of the Bacteriologist, State Board of Agriculture, Michigan, for the year ended June 30, 1917. Much work has been done on contagious abortion of cows. Vaccines prepared with the *Bacillus abortus* did not prevent infection with succeeding abortion in guinea-pigs. The bacillus soon dies out on wool, silk, and in soil; on the two former materials within a fortnight, and in soil within a week. Cultivations of leguminous bacteria have been tested as fertilisers for leguminous crops. On alfalfa they seem to be of benefit in about one-third of the crops treated, but on other crops no definite conclusion has yet been reached.

THE Report of the Departmental Committee appointed to inquire as to precautions for preventing the danger of infection by anthrax in the manipulation of wool, goat-hair, and camel-hair has just been issued. (Cd. 9057). The Disinfection Sub-Committee concludes that anthrax can only be prevented either by preventing the disease among animals or by the destruction of the organisms in the wool or hair. The Sub-Committee has devised a process for the last-named purpose, the essential features of which are:—(1) Treatment of the material with a warm aqueous solution of soap containing a little alkali, followed by squeezing between rollers; this disintegrates the blood-clots. (2) Treatment with a warm solution of formaldehyde in water and again squeezing; this destroys most of the spores. (3) Drying and standing for a short time, by which any remaining spores are killed. The Committee is of opinion that the Government should undertake the work of disinfection at a central institute or station. For the treatment of 10,000,000 lb. of wool annually the cost of the central station is estimated to be 18,000*l.*, and the working cost to be from 0·544*d.* to 0·824*d.* per lb. of untreated material. These figures were computed at pre-war prices, and about 75 per cent. would have to be added to meet present day conditions.

CAPT. E. G. FENTON discusses in the May issue of *Man* the remarkable cart-ruts found in Malta. It has been formerly assumed that they date from prehistoric times, and that they probably belong to the Neolithic period. There is no sign of a groove cut by horses' feet between the ruts, and the suggestion has been made that they are the result of human power in the shape of a number of men drawing waggons, and that the Neolithic civilisation was brought to a close by a period of desiccation, such as that discussed by Ellsworth Huntingdon in "The Pulse of Asia," the dawn of our Mediterranean historical period being heralded by the increase of moisture. Capt. Fenton, on the whole, believes that they date from the early part of the Iron age, at a time when the Mediterranean was moister and the island was capable of supporting a larger population than under present conditions. The suggestion that these climatic changes can be equated with events in Egyptian history is interesting, but the evidence is scarcely sufficient to support any definite conclusion. Prof. Boyd Dawkins, in the June issue of *Man*, asserts that the ruts are "due to the weathering of the rock under vaporal conditions. They are merely the ordinary joints, widened and eroded by the rain-water containing carbon dioxide, familiar to geologists in all limestone plateaux, and to be seen over very wide regions in Southern France."

A RESEARCH of interest to veterinarians and zoologists on the efficiency of some Anthelmintics has been published by M. C. Hall and W. D. Foster (*Journ. Agric. Research*, vol. xii., No. 7, 1918). By comparing the number of worms evacuated after the administration of various drugs with those found in the digestive tracts of "patients" killed a few days later a sort of "percentage efficiency" can be calculated. The number of experiments of this kind is necessarily limited, but the result in nearly all cases is disappointingly low. Dr. H. E. Cross has been trying the effect of various emulsions intended to protect camels from the attacks of blood-sucking flies (Bull. 76, Agric. Research Inst., Pusa); he finds that the only serviceable agent is castor-oil, which is too expensive for practical use.

A SYSTEMATIC zoological paper of more than usual interest is Mr. J. Hewitt's 'Survey of the Scorpion Fauna of South Africa," which constitutes part ii. of the Transactions of the Royal Society of South Africa (vol. vi., 1918). The region has a large number of genera and species, which are described in detail with the help of structural drawings and admirably reproduced photographs. The author takes occasion to discuss the bearing of the variation of features of systematic importance on questions concerning the factors of evolution, and concludes:—"In view of the continuous variability of most of the characters employed in the distinction of species amongst our scorpions, it seems probable that discontinuity arises most frequently through the elimination of intermediate forms rather than by mutation processes."

IN his latest studies on American Permian vertebrates (Contributions from Walker Museum, Chicago, vol. ii., No. 4), Prof. S. W. Williston discusses the origin of the vertebræ in the amphibians and reptiles. and shows that all stages in the development are now known. Inheriting separate pleurocentra, hypocentra, and neural arches from the early fishes, the land-vertebrates soon consolidated their centra, until in later reptiles the only remnants of the primitive condition are certain wedge-bones and some separate parts in the atlas and axis. Among other notes Prof. Williston also describes and illustrates some fine specimens of the brain-case of Eryops, Edaphosaurus, and Dimetrodon.

PROF. ROLLIN D. SALISBURY, in his address to the Section of Geology and Geography at the Pittsburgh meeting of the American Association for the Advancement of Science (*Science*, April 5), urged the claims of geology as a factor in general education, and pointed to modern geography as having even greater promise. Like Mr. Bateson in the "Cambridge Essays," he feels that "the type of subject which works on strictly mathematical lines cannot, by itself, afford the best preparations for the solution of the average problems of the average man." We require a "training in the methods by which uncertainties are cleared up," and the sciences concerned with Nature in the field furnish this training to a marked degree.

IN the Quarterly Journal of the Geological Society of London, vol. lxxiii., p. 1, Dr. A. Smith Woodward describes two additional cranial fragments and a molar tooth of Eoanthropus, which were discovered by Mr. Charles Dawson at Piltdown in 1915. Since one fragment is occipital, and the same region is represented in the imperfect skull originally described, there is no doubt that we now possess traces of a second individual. The paper is rendered still more valuable by an appendix by Prof. G. Elliot Smith, and by the printing of the discussion, in which Mr. Pycraft, Prof. A. Keith, and Sir Ray Lankester took an important part. Attention may be directed to Mr. Pycraft's comments on a ramus of the mandible of a chimpanzee with worn molars, sent him by Mr. G. T. Miller, who, as is well known, opposes the attribution of the Piltdown jaw to the skull fragments associated with it in the gravels.

A WRITER in the *Zeitschrift für angewandte Chemie* for March 22 estimates the available water-power in Germany at 11·4 million h.p., only about four millions being yet utilised. In 1910 the proportion utilised was only 5 per cent. of the steam-power produced, while in France the percentage has reached 40 per cent.

THE restoration of Alsace to France would put the latter country in possession of the valuable potash deposits discovered in 1904. These rich deposits cover an area of seven square miles, to the north-west of Mulhouse. The workable yield is estimated at 300 million tons, and they could be made to yield an annual output of 800,000 tons at a low cost of production. According to the *Zeitschrift für angewandte Chemie*, March 22, fifteen shafts have already been sunk, but production has been hampered by legal restrictions arising out of the German potash laws.

ACCORDING to a writer in the *Berg- und Hüttenmannischer Jahrbuch*, part i., 1917, there are extensive, unworked deposits of manganese ore in the Bukovina which reach into Rumanian territory. The article describes the deposits and the methods of working them. Analyses made show the yield of metallic manganese to be 40·65 per cent. The ore occurs in some parts in the form of outcrops, thus making it cheap and easy to win. Another authority, writing in *Stahl und Eisen* for April 4, estimates the quantity of manganese ore in the Kutais Government of Russia as thirty million tons, and in the Yekaterinoslav Government about eleven million tons. The possession of Batoum by the Turks should enable them to control the entire output of the deposit first mentioned, while the peace made with the Ukraine brings the second source of supply within the range of German influence.

FOR the making of chemical manufacturing plant chemists and metallurgists have long sought some form of metal which will resist the corrosive action of acids. Such a metal would have obvious advantages over the stoneware or similar breakable material ordinarily employed. In the laboratory it has long been known that iron could be made resistant to either sulphuric or nitric acids by alloying it with a certain proportion of silicon or chromium, but it is only recently that successful use has been made of this acid-resisting property on a large scale for chemical installations. In the Journal of the Society of Chemical Industry for March 30 Mr. S J. Tungay gives an account of what has been done in this country and abroad towards the industrial production of acid-resisting iron. Considerable manufacturing difficulties have had to be overcome, but British metallurgists are now able to produce a large variety of vessels and plant suitable for the making of sulphuric and nitric acids; the material employed is understood to be an iron-silicon alloy containing a small proportion of one of the rare elements. Since the outbreak of war the metal has been found a great boon in condensing the nitric acid required for high explosives, as by making use of it large nitric acid plants were installed very rapidly; moreover, the condensing efficiency obtained was high, since the alloy possesses a heat conductivity about ten times that of stoneware.

WE have received from the Controller of Munitions Mineral Oil Production a report on "The Production of Fuel Oil from Ordinary Gas-works Plant." In view of the peculiar and difficult conditions now obtaining, the technical advisers of this Department realised that existing apparatus and trained staffs must be employed, and they appear to have gone a long way to solve a problem of the greatest urgency. Without betraying any official secrets, it may be said that the enormous deposits of cannel and bastard cannel which occur in this country are being explored and tested with a view to the production of an indigenous oil supply It is obvious that our almost complete dependence on foreign sources for fuel oil, gas oil, benzine, and kerosene is a weakness that the enemy has not been slow to realise, and it is a matter for congratulation that on the eve of the fifth year of war the authorities have decided to prosecute their search for substitutes. It appears that the researches of the Department indicate that excellent yields of tar can be obtained from cannel coal—a fact which is by no means novel, seeing that, in the distant past, there actually was existent in Staffordshire a home oil industry. Where the present report, however, achieves novelty is in the production, at suitable temperatures, of not only a good yield of tar, but also an excellent production of gas and of sulphate of ammonia. It has commonly been considered that a good gas make indicates a low oil production, and *vice versa*. The Department, however, by means of a compromise on temperature and by various modifications of standard gas-works technique, has, without doubt, made a distinct step in the direction of producing ample supplies of fuel oil compatible with the maintenance of the gas output.

IN a communication to the Journal of the Röntgen Society, vol. xiv., No. 54, January, 1918, Mr. C. A. Schunck describes a series of tests made to ascertain the region of the ultra-violet spectrum that produces the greatest therapeutic effect. The several parts of the spectrum were isolated by the absorption of weak solutions of quinine sulphate, salicylic acid, and phenol, or by glass plates. The therapeutic effect was observed by exposure of the operator's forearm to the screened rays for definite periods of time, and note was taken of the reaction produced. The greatest effect appears in the region 2500 to 2350 Å.U.; the boundaries, however, of this region are not sharply marked.

Engineering of May 31 contains an account of the new Tröllhattan Canal, connecting Lake Vänern with the Kattegat. Sanctioned by a Parliamentary vote in May, 1909, the waterway in October, 1916, had reached a stage which enabled it to be opened to traffic, and the ceremony was performed by the King of Sweden. The project is really one of old standing, dating back to the days of Gustavus Vasa, who initiated steps for linking up Lake Vänern with Tröllhattan by means of a navigable waterway. The first lock was opened in 1607. It was not, however, until 1800 that through connection was established to Gothenburg. Various extensions have since been carried out, culminating in the development called the new canal, the cost of which has somewhat exceeded a million and a quarter sterling. The enlarged waterway, which is fifty-two miles in length, is adapted for vessels generally up to 13 ft. draught, but the locks, which are six in number, enabling a change in level of 140 ft. to be negotiated, are constructed to pass vessels of 16½ ft. draught, this being a provision to meet likely developments in the near future. Each of the lock-chambers has a length of 320 ft. and a width of 45 ft., with a depth of 18 ft. of water over sill. The canal has a mean bottom width of 79 ft. The traffic during last year amounted in the aggregate to 9759 vessels, totalling 870,668 tons. Of this number 7827 were steamers, 664 sailing vessels, and 1268 barges. The undertaking was designed and carried out under the direction of the Royal Waterfalls Board

OUR ASTRONOMICAL COLUMN.

KODAIKANAL OBSERVATORY REPORT.—The report of the Director of the Kodaikanal Observatory for the year 1917 has been received. The weather during the year was generally unfavourable, according to Indian standards, but substantial progress in many departments of solar research is recorded. Direct photographs of the sun were obtained on 294 days, monochromatic images of the disc in K light on 328 days, prominence plates on 262 days, and H_α disc plates on 255 days. Judging by the mean latitude of spots, it would appear that the maximum of the sunspot cycle was not reached, though the northern hemisphere may possibly have attained its greatest activity. The prominences, with a mean daily number of 19·8, were in excess of those recorded in 1916; the northern hemisphere continued to be more active than the southern, as regards both prominences and spots, and also as shown by prominences projected as absorption markings on the disc. Work with the large grating-spectrograph included the spectrum of Venus (see NATURE, vol. ci., p. 192), sun and arc comparison spectra, and the spectrographic determination of the solar rotation, in addition to experimental work on the "pole effect" in the iron arc. It has been found that most of the iron arc lines in the region between 4337 and 4494 show a tendency to shift towards the red with increasing exposure time, indicating that they are unsymmetrically widened towards the red to a very slight degree. The vertical motion-shift of 3 km./sec. reported by Perot for the B group of oxygen (telluric lines) was not confirmed by observations made at Kodaikanal. An attempt to photograph the conjunction of Regulus and the sun on August 22, in infra-red light, was unsuccessful, but the sky was not sufficiently clear to give a satisfactory test of the method. Time determinations and meteorological and seismological observations were also carried on.

ANNUARIO OF THE RIO DE JANEIRO OBSERVATORY.—The thirty-fourth issue of this useful almanac of 524 pages fully maintains the high standard of previous years. It is divided into four sections, dealing respectively with astronomical data for 1918, a collection of tables for the reduction of astronomical observations, geophysics and climatology, and a summary of meteorological observations made at thirty-three stations in Brazil. It is interesting to note that the tables include details of the corrections to be applied to the tabulated times of rising and setting of the sun and moon in order to obtain the corresponding data for other parts of the country; the inclusion of such data in our own official almanac would doubtless be generally welcomed. Since 1660 the magnetic declination at Rio de Janeiro has varied from 12° E. to its present value of about 11° W., and may be approximately represented by a formula given by the director of the observatory, Dr. H. Morize, namely, $d=5{\cdot}6^\circ+0{\cdot}08^\circ t+8{\cdot}0^\circ \sin(0{\cdot}73^\circ t-44{\cdot}1^\circ)$, where t is the interval in years from 1850 taken as zero.

ALEXANDER THE GREAT AND HIS CELESTIAL JOURNEY.

PHOTOGRAPHS were given in NATURE of August 23, 1917, and March 14, 1918, of traditional representations of Alexander, seated in a car drawn by flying griffins, from St. Mark's, Venice, and Bâle Cathedral, and it was conjectured that a diligent hunt would reveal many similar examples in Europe and England. Since then an article by Prof. R. S. Loomis has appeared in the *Burlington Magazine* of April and May, which shows that the author had been engaged already in a research on the subject of Alexander's celestial journey. Prof. Loomis gives copious references to earlier authorities, with the addition of more than a score of photographs of other examples of the representation, in which we are pleased to find some ten are taken from English churches and cathedrals, as Wells, Chester, Lincoln, Gloucester (surely Canterbury), and Beverley Minster, Cartmel Priory, Whalley Church, St. Mary's Darlington, and Charney Bassett, Berks.

The figure of Alexander can be recognised by the two spears he carries in his hands, baited at the end with a tasty lure to guide the griffins alongside to bear him aloft. They are not sceptres, or distaffs even, in the mistake of the local designation (Borgo-